PROJECT REPORT

On

UNDERSTANDING AND ADAPTATION OF THE BLOCK CHAIN INNOVATION IN LOGISTICS INDUSTRY

Submitted for the partial fulfilment of the requirement of the degree of Master of Business Management

In

International Transpiration and Logistics Management

By

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MAY, 2022

DECLARATION

I ANAND VINOD student of School of Maritime Management, Indian Maritime University, Cochin Campus pursuing **Master of Business Administration in International Transportation & Logistics Management,** hereby declare that this report titled "Understanding and Adaptation of the Block Chain innovation in Logistics Industry" has been prepared and submitted by me towards the partial fulfillment of the requirement for the award of degree of "**Master of Business Administration in International Transportation & Logistics Management, "** under the guidance of **Dr. P.A JAYAN,** Assistant Professor, School of Maritime Management, Indian Maritime University, Kochi Campus.

I also declare that this project report is my original work and has not been copied from any of the report previously submitted for the award of any Degree, Fellowship, or other in similar titles.

Place: ANAND VINOD

Date

ACKNOWLEDGEMENT

My heartfelt and sincere thanks to **Dr. JAYAN P A,** Assistant Professor, School of Maritime Management, Indian Maritime University, Cochin Campus who gave me the golden opportunity to do this project on the topic "Understanding and Adaptation of the Block Chain innovation in Logistics Industry" which also helped me in doing a lot of research and I came to know about so many new things.

I pay him deep sense of gratitude for guiding me in each step of the project, alleviating inspiration, encouraging and kind supervision in the completion of my project in spite of his busy schedule.

And I am also thankful to faculty members, library staffs, my family members, my friends and my well-wishers who were very cooperative during my project in providing appropriate guidance and support without whom this project would not have been completed successfully.

ANAND VINOD

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CHAPTER I: INTRODUCTION

1.1 **GLOBAL LOGISTICS INDUSTURY**

The global logistics industry encompasses all supply chain activities such as transportation, customer service, inventory management, information flow, and order processing. Warehousing, material handling, purchasing, packing, information transmission, and maintenance are some of the other supply chain tasks. In terms of revenue, the Logistics industry was worth US$ 8185.46 billion in 2015, and is predicted to reach US$ 15522.02 billion by 2023, rising at a CAGR of 7.5 percent from 2015 to 2024. In terms of volume, the market was worth 54.69 billion tons in 2015 and is predicted to reach 92.10 billion tons by 2024, rising at a CAGR of 6% between 2016 and 2024.

In 2017, the global logistics industry is also exposed to global geopolitical maneuverings, but various disruptions threaten to alter the global trade balance as we know it. The following are some examples:

- Low-cost manufacturing advantages will be offset by robotics, automation, and 3D/4D printing.

Localization and sustainability are favored by rampant protectionism. Supply chains are being pushed closer to demand by digitization and demand-driven logistics. The rise of the middle class in developing nations is changing supply and demand dynamics.

As a result, there are numerous venues that offer attractive value propositions. Retailers and manufacturers have plenty of possibilities, whether it's a pure play distribution center, manufacturing centre of excellence, transshipment port, regional E Commerce hub, or new market to sell in/source from. Furthermore, when considering global volatility and hypersensitivity to supply chain exceptions, supply chain modelling, simulation, and optimization are quickly becoming fundamental competencies.

1.2 **INDIAN LOGISTICS INDUSTRY**

The Indian logistics sector is worth $150 billion and accounts for 14.4% of the country's GDP. With the projected adoption of GST, more globalization, the expansion of ecommerce, favorable changes in regulatory laws, and government programs like "Sagarmala" and "Make in India," the sector is expected to reach $200 billion by 2020. India climbed 19 places in the World Bank's Logistics Performance Ranking 2016 from 54th in 2014 to 35th in 2016.

The unorganized sector (such as owners of less than 5 trucks, affiliated with a broker or a transport company, small warehouse operators, customs brokers, freight forwarders, etc.) accounts for nearly 99 percent of the USD 150 billion logistics cost, while the organized sector contributes slightly more than 1%, or approximately USD 1.5 billion. However, the industry is rapidly expanding, and lowering India's logistics costs from 14% to 9% of GDP (the level in the US) would result in savings of USD 50 billion

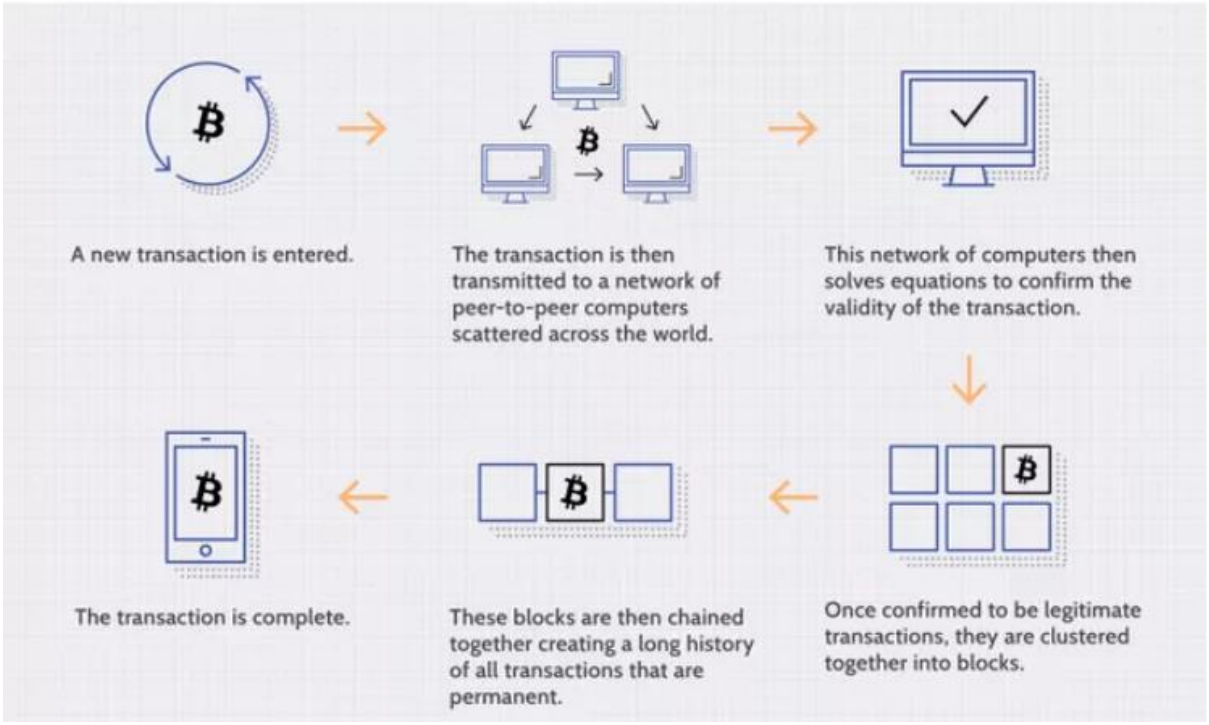
at the current GDP level, making Indian goods more competitive in the global market. Furthermore, increased expansion in the logistics industry would mean better service delivery and consumer happiness.

1.3 **BLOCK CHAIN**

A block chain is a decentralized database that is shared among computer network nodes. A block chain acts as a database, storing information in electronic form. Block chains are well known for their critical function in keeping a secure and decentralized record of transactions in crypto currency systems like Bit-coin. The block chain's novelty is that it ensures the accuracy and security of a data record while also generating trust without the requirement for a trusted third party.

The purpose of block chain is to enable for the recording and distribution of digital data without the ability to modify it. In this approach, a block chain serves as the foundation for immutable ledgers, or transaction records that can't be changed, erased, or destroyed. Block chains are also known as distributed ledger technology because of this (DLT).

First proposed as a research project in 1991, the block chain concept predated its first widespread application in use: Bitcoin, in 2009. In the years since, the use of block chains has exploded via the creation of various crypto currencies, decentralized finance (DeFi) applications, non-fungible tokens (NFTs), and smart contracts.



1.4 STATEMENT OF THE PROBLEM

Block chain has made life easier and better for employees of logistics. The barriers faced by Indian logistics companies are temporary. The current implementation of available block chain logistics has helped the companies survive and grow in the market. With this study we can see just how much block chain helped and its adaptability in the companies.

1.5 SCOPE OF THE STUDY

The scope of the study is limited to logistics companies. With reference to logistics the study aims to find out why block chain is not used in its full effect in fields like customer services, warehousing, and transportation and demand planning. There are automated recording and delivery methods available right now in Europe and USA. The wave of block chain is slowly hitting Asia and India and this study will show just how prepared Indian companies are.

1.6 SIGNIFICANCE OF THE STUDY

The study helps the how employees in logistics industry to understand just how many people are aware of the block chain technology while using its services and products. It will also show the benefits of the technology to its employees and see where it could go from here.

1.7 OBJECTIVE OF THE STUDY

1.7.1 Primary Objective

- To understand the adaptation of block chain technology in logistics sector in India using Technology Acceptance Model

1.7.2 Secondary Objective

- To understand the benefits of block chain in logistics
- To have a detail analysis of block chain use cases in logistics industry.

1.8 RESEARCH DESIGN

The study is based on descriptive in nature. Descriptive research designs help provide answers to the questions of who, what, when, where, and how associated with a particular research problem; a descriptive study cannot conclusively ascertain answers to why. Descriptive research is used to obtain information concerning the current status of the phenomena and to describe "what exists"

with respect to variables or conditions in a situation.

Population: - There are total of 217 responses from employees in Top level and Middle level employees from different logistics companies this also include employees who are withdrawn from a logistics job.

Survey: - Since the Population expected is more than 200 I had introduced a Google form which helped me to access information from employees all over India.

1.9 DATA COLLECTION

Primary Data: - Primary data are information collected by a researcher specifically for a research assignment. In other words, primary data are information that a company must gather because no one has compiled and published the information in a forum accessible to the public. The primary data used for the project are the raw materials of the study which were collected through questionnaire from the users.

Secondary Data: - Secondary data are the data collected by a party not related to the research study but collected these data for some other purpose and at different time in the past. If the researcher uses these data then these become secondary data for the current users. These may be available in written, typed or in electronic forms. Secondary data was collected from internet, website of the company, company financial books and books of related topics.

TOOLS FOR DATA COLLECTION

1.9.1 Questionnaire Method: - Questionnaires will be provided to the target audience for the purpose of primary data collection.

1.9.2 Statistical Tools: - Correlation is used to analyze the TAM model.

1.9.3 Research Model: - Technology Acceptance Model

CHAPTER II: REVIEW OF LITERATURE

1. A technology acceptance model for empirically testing new end-user information systems: theory and results Author: Fred **D.** Davis, Jr. Submitted to the Sloan School of Management. This study is to be considered as one of the basic model which is used to study Technological acceptance model testing on various products. The goal of this research is to develop and test a theoretical model of the effect of system characteristics on user acceptance of computer-based Information systems. The model, referred to as the technology acceptance model (TAM), is being developed with two major objectives in mind. First, it should improve our understanding of user acceptance processes, providing new theoretical insights into the successful design and implementation of information systems. Second, TAM should provide the theoretical basis for a practical "user acceptance testing" methodology that would enable system designers and implementers to evaluate proposed new systems prior to their implementation. Applying the proposed model in user acceptance testing would involve demonstrating system prototypes to potential users and measuring their motivation to use the alternative systems. Such user acceptance testing could provide useful information about the relative likelihood of success of proposed systems early in their development, where such information has greatest value. The technology acceptance model proposed and tested above represents a significant contribution toward establishing a valid motivational model of the user. Thus the present research has taken the first several steps toward the establishing a valid motivational model of the user. Moreover, this research has created a research foundation upon which investigators may base future research directed toward further progress in the understanding of user acceptance. The study has done before 1990s and considered to be bit old.
2. The Technology Acceptance Model: A Meta-Analysis Of Empirical Findings Author: Qingxiong Ma, Central Missouri State University, USA Liping Liu, University of Akron, USA It is one of a kind study which is taken technology acceptance model into numeric terms by considering relationship between ease of use perceived ease of use. In this study, researchers conducted a meta-analysis based on 26 selected empirical studies in order to synthesize the empirical evidence. The results suggest that both the correlation between usefulness and acceptance, and that between usefulness and ease of use are somewhat strong. Overall, he found that PU had a significantly greater correlation with system usage than did PEOU. Further regression analysis suggested that PEOU might be an antecedent of PU rather

than a direct determinant of system usage. That is, PEOU affects technology acceptance (TA) indirectly through PU.

3. Overview of The Technology Acceptance Model: Origins, Developments and Future Directions Author: Mohammad Chuttur Indiana University, USA Researcher believed User acceptance of technology has been an important field of study for over two decades now. Although many models have been proposed to explain and predict the use of a system, the Technology Acceptance Model has been the only one which has captured the most attention of the Information Systems community. Thus, it is essential for anyone willing to study user acceptance of technology to have an understanding of the Technology Acceptance Model. This paper provides a historical overview of the Technology Acceptance Model (TAM) by summarizing the evolution of TAM, its key applications, extensions, limitations, and criticisms from a selective list of published articles on the model. Current observations indicate that although TAM is a highly cited model, researchers share mixed opinions regarding its theoretical assumptions, and practical effectiveness. It is concluded that research in TAM lacks sufficient rigor and relevance that would make it a well-established theory for the community.

   Researcher states that there have been impressive number of studies on TAM but while several confirmatory researches have been obtained there are skeptics among some researchers regarding the application and theoretical accuracy of the model. Consequently it is tempting to conclude that research on TAM may have reached a saturation level such that future research will focus in developing new model that would exploit the strength of TAM model while discarding its weaknesses but we conclude TAM model is suitable for explaining and predicting online consumer behaviors.

4. Block Chain Logistics published by DHL Customer Solutions & Innovation look forward to future collaboration with your organization – together we can unlock the value of blockchain in logistics the study concludes Despite all the hype surrounding blockchain today, we believe that the logistics industry needs to leverage new technologies and embrace ways of rethinking old processes in the digital era. While there are still many challenges to overcome, we invite you to explore with us the opportunities that blockchain presents. By joining forces, we can create the right foundations for successful industry adoption of blockchain and we can ultimately unlock new value in logistics.

5. Blockchain Applications in Supply Chain by Davor Dujak & Domagjoj Sajiter Blockchain is a technological concept which evolves from the first crypto currency, Bitcoin, and disrupts constantly enlarging areas of economy. The concept of blockchain is developing, and while the future of Bitcoin remains unclear (as it is for the most elements of the economy) it is evident that the blockchain holds enormous potential for large-scale improvements. However, being a technology that could decrease significance many of today's large global corporations, institutions and power structures which have keen interest in preserving established hierarchies, its potential could well remain unexploited. This paper aims to introduce and present the concept of blockchain and its current applications in logistics and supply networks. Blockchain technology promises overpowering trust issues and allowing trustless, secure and authenticated system of logistics and supply chain information exchange in supply networks. The new implementations within supply chain are shifting from blockchain to a wider notion of distributed ledger technologies. Paper presents description and rationale behind current and possible future applications of blockchain in logistics and supply chain.
6. Bitcoin: A Peer-to-Peer Electronic Cash System by Satoshi Nakamoto suggest Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double-spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work. The longest chain not only serves as proof of the sequence of events witnessed, but proof that it came from the largest pool of CPU power. As long as a majority of CPU power is controlled by nodes that are not cooperating to attack the network, they'll generate the longest chain and outpace attackers. The network itself requires minimal structure. Messages are broadcast on a best effort basis, and nodes can leave and rejoin the network at will, accepting the longest proof-of-work chain as proof of what happened while they were gone.
7. A literature review of blockchain technology applications in supply chains: A comprehensive analysis of themes, methodologies and industries by Ming K Lim This article uses descriptive and content analysis to review publications related to blockchain-based supply chains between 2017 and 2020 inclusive. To fully explore research on blockchain-based supply chains, four well-designed questions are proposed and addressed, namely, the value of blockchain in supply chains, the attraction of scholars to particular supply chain themes, the development of

research methodologies and illustration types in adopting blockchain in supply chains, and the types of industries involved in blockchain-based supply chains. The results reveal that there is growing interest in applying blockchain technology to supply chain operations. A detailed analysis of findings is provided to identify the future opportunities of blockchain-based supply chains, including prospects for tertiary industries and concerted efforts that are necessary to explore sustainability themes. This article provides valuable information to help scholars and practitioners better determine the relevant research topics to accelerate the development of blockchain-based supply chains.

8. Exploring The Acceptance For E-Learning Using Technology Acceptance Model Among University Students In India Author -Ratna Paluri This paper examines the acceptance and behaviour of students towards e-learning using the technology acceptance model (TAM), within the framework of a course. The instrument used in the current study adopts the scale developed by Davis (1989). This study is set against a lack of consistent, detailed research on the factors influencing the acceptance of e-learning by students in India. In line with previous research, results suggest that TAM is a strong theoretical model (Ronnie et al., 2011), where its validity can extend to the e-learning context. Significant relationships were observed between perceived ease of use, perceived usefulness, attitude, behavioral intention to use and actual use. Perceived usefulness strongly mediated perceived ease of use and attitude, while attitude mediated perceived usefulness, perceived ease of use and behavioral intention to use e-learning complete mediation was observed for perceived usefulness between perceived ease of use and intention to use. Perceived ease of use, perceived usefulness and intention were mediated by attitude. Similarly, behavioral intention mediated for attitude towards e-learning and actual use of e-learning.
9. Measuring Logistics Performance for Competitiveness- A case study of Automotive Connection Systems Company, Kerala, India Study reviews that the company having implemented a logistics system must continually monitor and evaluate its effectiveness. Similarly, a company may utilize several different methods to measure logistics performance. This study was conducted at Automotive System Connections Ltd., in Kerala, India. This company's warehouse handles 720 traded parts out of which 96% comes from intercompany basis and the remaining 4 % of items comes from their local suppliers located in India. It was found that the company moves 98% of traded parts by road / surface transportation mode and the remaining only by air cargo mode. These parts are supplied to original equipment

manufacturers in India. So, logistics performance measurement was considered an important area for this research. Twelve important metrics were selected for measurements and three years data collected from their main information report (MIR), returns, and reports followed by interview method with senior executives of the company. This company is in the process of implementing lean approach in their warehouse operations. This company should more focus on some of the metrics like inventory turnover ratio, overall customer satisfaction, total logistics cost, and capacity of warehouse vs space utilization. This company should focus on Full Truck Load (FTL) rather than Less Truck Load (LTL) by consolidation and collaboration with Third Party Logistics Service providers (3PL). This company should also change in co-term to Freight on Board (FOB) / Free along Ship side (FAS) from Ex- Works.

CHAPTER III: THEORETICAL FRAMEWORK

3.1 Block Chain Logistics Industry

Logistics companies are growing increasingly complicated, with more players participating directly or indirectly. This intricacy creates communication and end-to-end visibility issues, making logistical procedures inefficient. At the same time, all supply chain actors' demands for openness, reliability, and service are rising.

Some commentators see vast potential for the technology to be applied within logistics functions, however, discussions about block chain often fall into the trap of excessive hype by suggesting that it could be a solution for everything. The truth is that block chain can't solve real-world problems by itself. Instead, it's an underlying technology that makes it possible to share data across digital networks. There's currently no block chain solution available that offers industrial-grade quality – except a handful of pilot projects and consortiums.

3.1.1 Advantage of block chain in logistics

a. **Enhance supply chain transparency and traceability**

- Provide end-to-end transparency: By integrating data from all supply chain partners, block chain creates a single source of truth.
- Track performance: Block chain-based tracking of carrier and supplier performance history provides 'trustworthy' data on past performance.
- Ascertain provenance: Block chain delivers a proof-of-origin as well as guarantee of compliance and safety standards across the whole supply chain.
- Provide end-to-end transparency: By integrating data from all supply chain partners, block chain creates a single source of truth.
- Track performance: Block chain-based tracking of carrier and supplier performance history is available. 'Reliable' data on previous performance.
- Verify provenance: Block chain offers a proof-of-origin as well as assurances of compliance and security standards across the entire supply chain.

b. **Ensure security, immutability and authenticity**

- Authenticate data and documents: Due to its immutable characteristics achieved via cryptography, block chain provides a secure and encrypted platform to exchange data and documents.

- Detect fraud: Every transaction is visible to all participants and nothing can be removed without it being detected. This eliminates areas where fraud occurs (e.g. double brokering). Shippers can confirm authenticity by tracking when each document or transaction was modified (time stamping).
- Prevent theft: Block chain can contain detailed information and rules, such as photo ID requirements for pick-up or delivery, which improves security

c. Reduce process complexity

- Remove intermediaries: Block chain eliminates the need for intermediaries by establishing trust in the ecosystem and allowing peer-to-peer transactions.
- Improve quality assurance: Data can be assessed and validated by any organization participating in a transaction. Freight evaluation at pick-up and delivery locations can help to avoid disagreements.
- Increase the amount of automation: "Smart contracts" can automate processes such as payments, ownership transfers, tariff settlements, and cargo checks. Smart contracts are computer-coded, rule-based, automatic follow-up activities. They can then proceed to the next activity specified in the contract, such as making an automatic payment once the products have been validated.

d. **Improve operational efficiencies**

- Increase compliance: Block chain can be used in conjunction with Electronic Logging Devices (ELDs), which transfer real-time data regarding driving behavior to a block chain platform.
- Lower transaction costs: By verifying each transaction, block chain helps to eliminate transaction repetition and process errors.
- Reduce human error: Because smart contracts encourage process automation, block chain reduces the risk of human error while also being faster than manual operations.

3.2 Block chain use in logistics

- **Provenance**: is a timeline of changes in an object's ownership, possession, or placement in logistics. It's akin to an audit trail, and its goal is to ensure that every shipping item has a digital "passport" that certifies its validity. These passports provide information regarding the product's origins, production date, and transit route. The wine industry is a good illustration of how block chain may be used to track provenance. Fake alcohol is a serious issue in this market because it can hurt people's health directly. Provenance allows you to

track down the winery that made it, as well as all other parties involved, such as regulators, distributors, and merchants. This takes care of the flow.

- **Payments and Invoicing**: Because the organizations involved keep separate records, invoicing and payments connected to logistical operations sometimes involve manual and paper-based processes. Companies spend a lot of time matching invoices to payments received or credited. Block chain may be used to store and exchange digitized documents, as well as create smart contracts that handle invoices and payments automatically, reducing processing times and ensuring accuracy. A connected pallet, for example, can send an automatic confirmation of the delivery time or condition of the items. The block chain technology then confirms the delivery and pays any necessary payments automatically. This improves efficiency and trust substantially Information such as geo waypoints

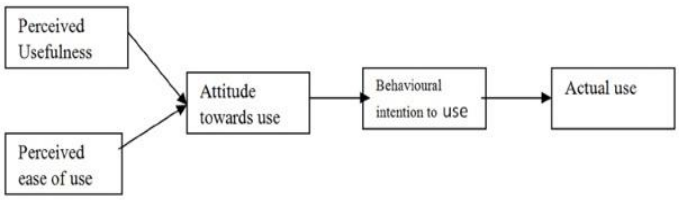
- **Digital Documentation** Intelligent logistics contracts can be enabled by combining block chain and the Internet of Things (IoT). When digitized documents (such as bills of lading, certificates, invoices, and pre-advice) and real-time shipment data are embedded in block chain-based systems, this is conceivable. At the ports of Antwerp, Rotterdam, and Singapore, digital documentation and smart contracts using block chain are already in existence. In Rotterdam, for example, physical, administrative, and financial streams are now connected via paperless operations. This provides security and addresses concerns such as double spending, while also decreasing paperwork, linking data silos, and automating operations.
- **Identity Management** Block chain Identity Management is a safe way to keep people's identities safe from harm or theft. It uses a distributed trust paradigm to maintain anonymity, with authorized participants securing, verifying, and validating identification papers. Companies can use block chain-based identity management to manage access permissions to input information about pick-up and delivery of goods, for example. Furthermore, Block chain Identity Management can be used to verify third-party suppliers in Know Your Customer/Anti Money Laundering processes, last-mile deliveries, and truck driver licensing.
- **Logistics Marketplace** Block chain allows for seamless communication across complex production networks. It improves trust, security, and speed in this way. It can even be used

to build platforms where logistics service providers can offer real-time free capacity in trucks or ships. For example, Cargo Chain is an interactive marketplace that allows logistics providers to exchange real-time availability. It includes full traceability, a payment solution, a transportation management system, and a center for consignment management via web and mobile applications. Cargo Chain can boost partner efficiency while lowering transaction costs.

Technological Acceptance Model

`The prolific stream of research on information systems use takes a variety of theoretical perspectives. Of all the theories, the Technology Acceptance Model (TAM) is considered the most influential and commonly employed theory for describing an individual's acceptance of information systems. TAM, adapted from the Theory of Reasoned Action [Ajzen and Fishbein, 1980] and originally proposed by Davis [1986], assumes that an individual's information systems acceptance is determined by two major variables

- Perceived Usefulness (PU) and
- Perceived Ease of Use (PEOU).



During the past eighteen years, the information systems community considered TAM a parsimonious and powerful theory [Lucas and Spitler, 1999; Venkatesh and Davis, 2000]. Further supporting the notion of TAM's popularity, Venkatesh and Davis [2000] found that the first two TAM articles, by Davis [1989] and Davis et al. [1989] received 424 journal citations in the Social Science Citation Index (SSCI) by the beginning of 2000. Extending the citation search further, we found to 698 journal citation by 2003. TAM has been applied to different technologies (e.g. word processors, e-mail, WWW, GSS, Hospital Information Systems) under different situations (e.g., time and culture) with different control factors (e.g., gender, organizational type and size) and different subjects (e.g. undergraduate students, MBAs, and knowledge workers), leading its proponents to believe in its robustness. Currently, researchers in the IS field consider TAM one of the information systems fields' own theories, and still put much effort into the study of research using the theory.

Despite its great success, however, few previous systematic efforts trace its history or investigate and evaluate its findings, limitations, and future [e.g., Doll et al., 1998; Gefen and Straub, 2000; Legris et al., 2003]. Evaluation is crucial for the IS community in that it helps researchers of IS adoption understand TAM's past research findings, identify possible research topics, and conduct future studies. In addition, it helps educate current IS doctoral students in examining how a well-known IS-owned theory evolved.

The present study goes back to 1986, traces the TAM research trajectory, and extensively investigates TAM's findings. The research purpose of the study is to answer the following five questions:

- How much progress did TAM make over the past eighteen years
- What are the findings and discoveries of TAM research?
- Who published what and where did they publish it?
- What do leading IS researchers currently think about TAM research?
- What are future directions for TAM research?

In all, one hundred and one articles published in information systems journals during 1986-2003 and survey results from thirty-two leading ARE researchers were analyzed.

The antecedents of attitude toward websites include consumers' beliefs in the availability, design attractiveness, and structure of information on those websites (Luna, Peracchio, & Juan, 2002; Yilmaz, 2004). Since behavioral intentions depend on cognitive choice, a potential online shopper can respond either favorably or unfavorably towards the idea of engaging in online purchasing. Davis (1989) states that the power to attract online shoppers lies in the technology's usability and usefulness, and he defines perceived usefulness (PU) as the belief that using the application will increase one's performance. Researchers have found that PU influences intention to use Internet shopping (Koufaris, 2002). Venkatesh and Davis (2000) and Moon and Kim (2001) also reported that PU had a significantly positive influence on trust, attitude, and behavioral intentions

PERCEIVED USEFULNESS

The antecedents of attitude toward websites include consumers' beliefs in the availability, design attractiveness, and structure of information on those websites (Luna, Peracchio, & Juan, 2002; Yilmaz, 2004). Since behavioral intentions depend on cognitive choice, a potential online shopper can respond either favorably or unfavorably towards the idea of engaging in online purchasing.

PERCEIVED EASE OF USE (PEOU)

According to Davis, perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology.

Perceived ease of use is defined as the individual's perception that using the new technology will be free of effort (Davis, 1989, 1993). Applying this context to that of online shopping, ease of use refers to consumers 'perceptions that shopping on the Internet will involve a minimum of effort (Davis, 1989, 1993). Whereas perceived usefulness refers to consumers' perceptions regarding the outcome of the online shopping experience, perceived ease of use refers to their perceptions regarding the process leading to the final online shopping outcome (Monsuwe, Dellaert, and Ruyter, 2004). In short, perceived usefulness is how effective shopping on the Internet is in helping consumers accomplish their tasks and perceived ease of use is how easy the Internet is to use as a shopping medium (Monsuwe, Dellaert, and Ruyter, 2004). According to the TAM, perceived ease of use has a dual effect, direct as well as indirect, on consumers' intention to shop online. The indirect effect on intention occurs through perceived usefulness because the easier a technology is to use, the more useful it can be (Venkatesh, 2000; Dabholkar, 1996; Davis, Bagozzi, and Warshaw, 1989).

BEHAVIORAL INTENTION

This refers to the motivational factors that influence a given behavior where the stronger the intention to perform the behavior, the more likely the behavior will be performed.

ATTITUDE

In psychology, an attitude is a mental and emotional phenomenon that inheres in or characterizes a person. They are complicated and acquired through experiences. It is a person's predisposition state of mind about a value that is triggered by a response expression towards oneself another person, place, thing, or event (the attitude object), which influences the individual's thought and action. Individuals' feelings about themselves and the world are the most easily known attitudes in psychology.

ACTUAL USE

The actual system use is the end-point where people use the technology. Attitude toward use is identified as the target behavior of a user of technology. Attitude toward use contains the positive or negative feelings of users regarding the usage of new technology. It may either be positive or negative, depending on the technology. A positive attitude is identified as an actual state for implementing that particular technology identified that attitude toward online shopping positively affects the behavior intention of the consumer. Also, many studies proved and revealed that there is a connection between positive feelings of the consumer and behavior intention to use technology usage toward online shopping.

CHAPTER IV: DATA ANALYSIS

4.1 Research Constructs

Constructs	Item
Perceived Usefulness	RQ1: Using the blockchain would improve my performance RQ2: Using the blockchain would improve my productivity RQ3: Using the blockchain would enhance my effectiveness in working RQ4: I find the blockchain would be better than already existing mode of operation
Perceived ease of use	RQ1:Interaction with the blockchain is clear and understandable RQ2: Interaction with the block chain websites does not require a lot of mental effort. RQ3: It is easy to get the blockchain to do what i want it to do RQ4: It is easy to use the blockchain for logistics
Attitude	RQ1: Using blockchain would be a good idea RQ2: Using blockchain in logistics would be a wise idea RQ3: I like the idea of using blockchain for logistics RQ4: Using blockchain for logistics would be a pleasant experience
Behavior intention to use	RQ1: Assuming I have access to blockchain, I intend to use it. RQ2: Given that I have access to the blockchain, I predict that I would use it. RQ3: If I have access to the blockchain, I want to use it as much as possible
Actual Use	RQ1: Company uses promote blockchain activities.

4.2 Cronbach's alpha coefficients

Case Processing Summary

		N	%
Cases	Valid	258	100.0
	Excluded[a]	0	.0
	Total	258	100.0

Reliability Statistics

Cronbach's Alpha	N of Items
.823	5

Cronbach's alpha is a measure of the internal consistency or reliability between several items, measurements or ratings. In other words, it estimates how reliable are the responses of a questionnaire (or domain of a questionnaire), an instrumentation or rating evaluated by subjects which will indicate the stability of the tools. The study showed that all questions have Good Internal Consistency of more than or equal to 8.

4.3 CORRELATION ANALYISIS

4.3.1 Hypothesis

H1: There is a significant positive relationship between the 'Ease of Use' and the 'Perceived Usefulness'.

H2: There is a significant positive relationship between the 'Perceived Usefulness' and 'Attitude towards Using'.

H3: There is a significant positive relationship between the 'Perceived Usefulness' and 'Intention to Use'.

H4: There is a significant positive relationship between 'Attitude towards Using' and

‘Intention to Use’.

Correlations

		PEOU	PU	Attitude	BI	Actual Use
PEOU	Pearson Correlation	1	.552**	.562**	.481**	.369**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	258	258	258	258	258
PU	Pearson Correlation	.552**	1	.504**	.506**	.363**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	258	258	258	258	258
AU	Pearson Correlation	.562**	.504**	1	.602**	.523**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	258	258	258	258	258
BI	Pearson Correlation	.481**	.506**	.602**	1	.464**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	258	258	258	258	258
Actual Use	Pearson Correlation	.369**	.363**	.523**	.464**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	258	258	258	258	258

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation study shows that there is significant correlation between all the variables that have dependency on the actual use of block chain in logistics Industry.

4.4 REGRESSION ANALYSIS

4.4.1 Hypothesis

H1: There is a significant impact between the 'Ease of Use' and the 'Perceived Usefulness'.

H2: There is a significant impact between the 'Perceived Usefulness' and 'Attitude towards Using'.

H3: There is a significant impact between the 'Perceived Usefulness' and 'Intention to Use'.

H4: There is a significant impact between 'Attitude towards Using' and 'Intention to Use'.

Regression Values

	PU	PEOU	ATTITUDE	Bev_INT	ActlUSE
PU		0.305			
PEOU					
ATTITUDE	0.254	0.316			
Bev_INT			0.363		
ActlUSE				0.274	

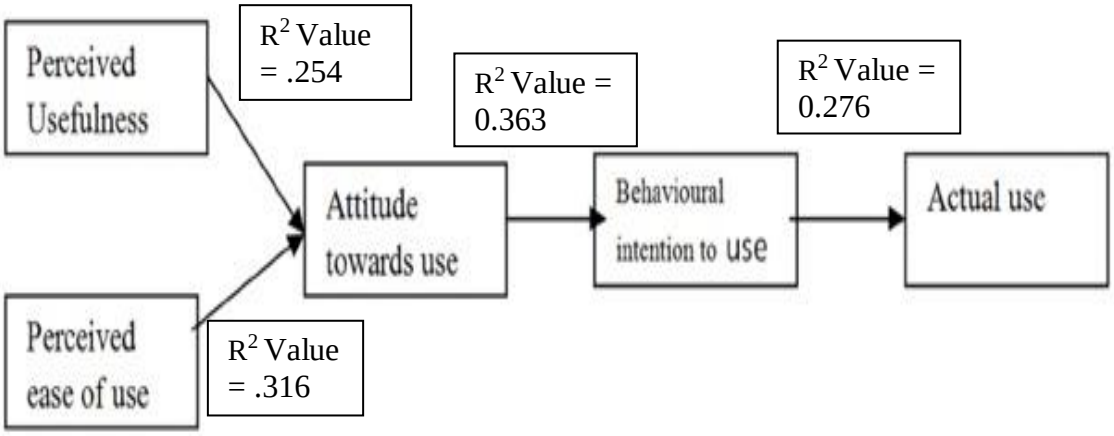
Significance Value

	PU	PEOU	ATTITUDE	Bev_INT	ActlUSE
PU		<0.001			
ATTITUDE	<0.001	<0.001			
Bev_INT			0.004		
ActlUSE				<0.001	

Interpretation:

- The PU has a significant impact on PEOU of 30.5% and significance of less than 0.001
- Attitude have a significant impact on PU & PEOU of 25.4% & 31.6% respectively and significance of less than 0.001

- Behavior intention has significant impact on attitude of 36.3% and significance of 0.004
- Actual use has significant impact on Behavior Intention of 27.6% and significance of less than 0.001



4.5 **Literature Review Analysis (Blockchain and Logistic)**

According to Tijan et al. (2019), there is a lack of transparency and complexity in the supply chain. It would be interesting for parties participating in the logistics process to introduce and develop blockchain technology in order to improve and sustain logistics processes in the supply chain. For example, in the logistics and manufacturing industries, decentralized principles (blockchain principle) are commonly used to track items and transfer containers. Comprehensive technical solutions are required to meet the demand for greater supply chain transparency (traceability from start to end). Blockchain or related concepts are geared toward solving a variety of logistics issues.

Aside from the hype about radical change through new sources of blockchain-based control and influence, as well as the promise of dramatically lower transaction costs, blockchain technology has the potential to become the record for the majority of transactions in logistics, where tracking transactions is a major activity. In this profession, keeping track of past actions and performance, as well as anticipated activities, is critical. (Dobrovnik)(2018 own translation).

Blockchain technology can increase the efficiency and transparency of the supply chain and positively all logistics processes, from storage to delivery and payment. In addition to the increased transparency and security achieved through blockchain, the physical flow of goods can be accelerated. (Tijan)(2019, own translation).

Shared data across the supply chain can improve transparency in logistics, allowing consumers to make better decisions about the items they buy. These are only a handful of the many possibilities presented by blockchain (Kückelhaus)(2018).

Bowersox and Closs (1996), apud de Souza, Carvalho, and Liboreiro (2006), cite three reasons for the requirement for real-time, accurate information in logistics and supply chain management.

Customers first recognize that order status, product availability, delivery schedules, and billing information are all important aspects of customer service. Second, with the goal of reducing inventory across the supply chain, executives recognize that with the right information, they can successfully minimize inventory and human resource needs. Inventory can be decreased by eliminating demand uncertainty when requirements are planned using the most up-to-date information. Third, information accessibility enhances flexibility in determining how much, when, and where resources can be employed strategically.

Based on a prototype used in the pharmaceutical business, the German global logistics operator Kückelhaus (2018) and an American consulting firm produced a paper on the technological potential of blockchain in logistics. The new technology, according to both organisations, can be used in asset management to provide traceability, transparency, and value in the logistics chain. This software can also assist with contract management, removing the need for third-party validation.

Blockchain technology, according to Santhi & Muthuswamy (2022), provides all of the resources needed to overcome logistics inefficiencies. For this to happen, blockchain must serve as the logistics network's backbone. It will take care of everything, including recording transactions, establishing an efficient and transparent system, and tracking assets with all required documents. The unchangeable nature of the decentralised structure allows for participation from all elements of the supply chain. It ensures security using cryptography.

"Every time a product is traded between the sides, the transaction can be documented, creating a permanent history of a certain product from manufacturing to sale," according to "blockchain technology in the supply chain." "Data generated at each stage of the product's life cycle, as it moves through the value chain (from manufacture to consumption), can be logged as a transaction, producing a permanent history of the product."

Logistics benefit from blockchain technology since it allows for total supply chain insight. It is regarded to illustrate the movement of items in various stages and processes of the supply chain and enable logistics operators' decision-making under complete visibility. According to

Tijan (2019), his method of establishing a business process will achieve the basic goal of logistics, which is to get items to the right place, at the right time, in the correct amount, and in their original state. Also all parties involved in shipping can utilize blockchain to improve sustainability, decrease or eliminate fraud and errors, improve inventory management, cut mailing costs, reduce delays caused by paperwork, waste, and discover problems more quickly.

Relevance of Blockchain's Application to Logistics

All parties involved in shipping can utilize blockchain to improve sustainability, decrease or eliminate fraud and errors, improve inventory management, cut mailing costs, reduce delays caused by paperwork, waste, and discover problems more quickly.(IBM 2017)

According to the article by Badzar 2016, blockchain technology in logistics may considerably improve the transparency of the entire production chain; it is seen as information disclosure and is recognized as a critical component for a business's long-term viability. Information sharing fosters and strengthens relationships between suppliers and customers, resulting in more efficient transactions.

"Blockchain has been identified as a technology that will be deployed in many supply chains to consider the benefits of visibility, optimization, and forecasting," according to a recent IBM Institute Expert Insights research.

The information on the shipping processes will be digital, allowing all parties to access it at any time. "As a result, risks are reduced and delivery quality is improved. Furthermore, it will enable firms to reduce waste, deterioration, and flaws."

When there is not full sharing of information, each company starts working with what it has available and ends up with wrong logical conclusions. Without this communication, production costs per unit increase, as well as higher lead times, lower product availability, and damage to the relationship between the links. The expected consequence ends up being a drop in profitability and value, and an overall drop in performance.

CHAPTER V: CONCLUSION

5.1 FINDINGS

- Majority of the respondents are male
- Majority population has a education qualification of Post-graduation that help to increase the quality of research.
- Majority of the respondents are between the age of 23-28
- Majority of the respondents are employees of Amazon
- All paths created under TAM model have significant minimal impact.
- All paths created under TAM model have significant correlation.
- Perceived ease of use has significant impact on attitude that shows if companies design employee friendly block chain services found it more useful, and it will enhance the intention to use the services.
- Perceived usefulness and ease of use will result significant attitude building that will help to increase use blockchain activity.
- Employee's attitude has significant impact and correlation on intention to use more of blockchain technology.
- Behavior Intention acts as a mediating variable of Attitude and actual use.
- Attitude acts as a mediating variable for Perceived Ease of Use and Perceived Use towards Behavior Intention
- Blockchain has various advantages, including transparency, traceability, security, efficiency, reliability, and immutability; these can be good solutions for fixing supply chains in the logistics field, even if the application is simple.

5.2 CONCLUSION

Blockchain has many potential advantages in the logistic industry. It enables companies to increase efficiency (e.g. process automation, reduced paperwork, etc.), transparency and traceability, while also making supply chains more secure as the origin and authenticity of products is known, proven and shared.

However, companies are waiting for the real breakthrough solution for logistics functions. There is a lack of trust and understanding regarding the technology and its applications. Many executives are still unclear about what blockchain is and how it is changing business. Block chain's capacity to offer a new form of infrastructure and a new way to digitize assets through tokens is not easy to explain because it is an underlying technology, and all happens behind the scenes.

Currently, there is no industry standard for blockchain available. Instead the market offers very fragmented solutions. Thus, waiting for a solution to emerge for logistic functions may not be the right strategy. Similar to EDI in the past, there has to be a big push from e.g. the retail, chemical or automotive industry, where industry wide standardization has already been proven, in order to develop a viable scale beyond pilots.

What does this mean for your individual organization? Should you just "wait and see"? Blockchain offers the potential to create value in logistics, however its implementation and use is not that straight forward, as we have highlighted. Given this situation and based on our experience from many technology-enabled transformations in operations, PwC strongly suggests to lay the groundwork for blockchain technology. Organizations have to identify and understand the relevant applications and requirements for their logistics processes in the first place. Secondly, it is also critical to look at the potential use of blockchain in logistics in the overall context of supply chain development. In this way organizations ensure to be prepared for blockchain or any other emerging technology, as they all require the same foundation.

5.3 SUGGESTION

So blockchain in theory seems to be a potential solution for some logistics challenges and there are interesting use cases out there. So why is not everybody using it.We have identified five key hurdles

1. **Make the business case: where and how to start**
   - Commit to new ways of working Creating a blockchain doesn't have to mean complete reinvention, but you need to make sure you don't slip into familiar ways of doing things. New ways of thinking and operating will be required.
   - Frame the problem and solution your blockchain project needs to be supported by a strategy. What is the issue you are addressing, and how will blockchain help? How might this same issue be affecting others in your industry?
   - Start small, then scale up Make sure you know where blockchain will fit in your business environment, and fine-tune issues along the way. But stay focused on the long-term value: an external shared resource that makes new scale economies possible.
2. **Build an industry ecosystem: new rules for the new relationships**
   - Focus on a cooperative few Start with smaller ecosystems with a tradition of cooperating on matters of industry-wide importance. It's also possible to build a blockchain that starts with just a few stakeholders but is ready to expand.
   - Broaden your network Blockchain consortia are valuable resources for staying close to technology developments, but you can look to established industry groups or trade organizations to find a community for exploring industry applications.
   - Work across the value chain Conduct a competitive analysis: Are competitors or new entrants already planning on using blockchain? Is there a potential for partnership? Will you have to participate in their blockchain solution in order to continue doing business?
3. **Design deliberately: Determine rules of engagement**
   - Confront risks early Plan to add cyber security, compliance, and legal and audit specialists to blockchain development teams. Involving risk professionals from the

start will enable you to build a framework that regulators and all your stakeholders will trust.

- Consider privacy implications Blockchain needs to fit into enterprise privacy strategies. GDPR, for example, requires that personally identifiable information be erasable. This has to be reconciled with the fact that data immutability is an important characteristic of blockchain. Invest in data and processes Traditional organizational processes, such as sales, manufacturing and shipping, are often suboptimal and siloes. Focusing efforts to streamline processes and data flows lays the groundwork for blockchain efforts.

4. **Navigate regulatory uncertainty: watch, but don't wait**
    - Shape the trusted tech discussion the risks of blockchain, and how to trust it, are part of a growing public discussion of responsible innovation and trust in technology. Engage with regulators and industry groups to help shape emerging policies and best practices.
    - Monitor evolving regulation besides directly regulating the technology itself, laws around data use and protection can fundamentally change how blockchain operates. It is vital to engage with regulators to help shape how the environment evolves.
    - Use existing regulation as a guide Current regulations still apply – but they may apply in different ways. By and large, we expect existing regulation to extend to new business models and applications. If you remain agile, you'll be able to adapt and remain compliant.

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GLOSSARY

Retail: the sale of goods to the public in relatively small quantities for use or consumption rather than for resale.
Supply Chain (s): the sequence of processes involved in the production and distribution of a commodity.
Trade: the action of buying and selling goods and services
Vessel: a craft for traveling on water, now usually one larger than an ordinary rowboat; a ship or boat.
Blockchain: Blockchain is a system of recording information in a way that makes it difficult or impossible to change, hack, or cheat the system